

Application No. 09/508,979
Supplemental Amendment dated November 14, 2003

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Previously presented) A method of modifying the content or composition, or content and composition, of a metabolite in the storage organ of a plant, said metabolite selected from the group consisting of fatty acid, starch, soluble non-starch polysaccharide, insoluble non-starch polysaccharide, fibre, and total protein nitrogen, said method comprising:
 - (i) expressing in the storage organ of the plant a chimeric gene comprising a nucleotide sequence encoding a sulfur-rich protein placed operably in connection with a promoter sequence capable of conferring expression in said storage organ, wherein the sulfur-rich protein is a 2S protein or the Asp1 synthetic protein;
 - (ii) determining the content or composition, or content and composition, of a metabolite in said storage organ, said metabolite selected from the group consisting of fatty acid, starch, soluble non-starch polysaccharide, insoluble non-starch polysaccharide, fibre and total protein nitrogen, and
 - (iii) selecting a plant having a modified content or composition, or content and composition, of said metabolite in the storage organ thereof, as compared to a plant in which said chimeric gene is not expressed.
2. (Original) The method according to claim 1 wherein the storage organ is a seed.

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3. (Canceled)
4. (Previously Presented) The method according to claim 1 wherein the metabolite is selected from the group consisting of the total protein nitrogen content of seeds, the fatty acid content of seeds, the fatty acid composition of seeds, the fibre content of seeds and the fibre quality of seeds.
5. (Previously presented) The method according to claim 1 wherein the total protein nitrogen content is increased.
6. (Previously presented) The method according to claim 1 wherein the fibre content or composition is modified.
7. (Canceled)
8. (Previously presented) The method according to claim 1 wherein the fatty acid content is increased or decreased.
- 9-10. (Canceled)
11. (Previously presented) The method according to claim 1 wherein the sulfur-rich protein is Brazil Nut Protein (BNP).
12. (Previously presented) The method according to claim 1 or wherein the sulfur-rich protein is sunflower seed albumin (SSA).

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13. (Previously presented) The method according to claim 1 wherein the sulfur-rich protein is the Asp1 synthetic protein.
14. (Previously presented) The method according to claim 1 wherein the plant is a dicotyledonous plant.
15. (Previously presented) The method according to claim 14 wherein the dicotyledonous plant is a pea or chickpea plant.
16. (Previously presented) The method according to claim 1 wherein the promoter sequence comprises the pea vicilin gene promoter sequence.
17. (Previously presented) The method according to claim 1 wherein the plant is a monocotyledonous plant.
18. (Original) The method according to claim 17 wherein the monocotyledonous plant is a rice plant.
19. (Previously presented) The method according to claim 1 wherein the promoter comprises a *Triticum aestivum* HMW glutenin promoter sequence.
20. (Previously presented) The method according to claim 1 further comprising the first steps of:
 - (i) introducing the chimeric gene into a plant cell, tissue, organ or whole organism; and
 - (ii) regenerating an intact plant therefrom.

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21. (Previously presented) A method of increasing the total protein nitrogen content of seeds of a plant, said method comprising:
 - (i) expressing in the seeds of the plant a chimeric gene comprising a nucleotide sequence encoding a sulfur-rich protein placed operably in connection with a promoter sequence capable of conferring expression in said seeds, wherein the sulfur-rich protein is a 2S protein or the Asp1 synthetic protein, said nucleotide sequence also positioned upstream of a transcription termination sequence; determining the level of total protein nitrogen in the seeds; and
 - (ii) selecting a plant having an increased total protein nitrogen content in the seeds thereof as compared to the seeds of a plant which does not express the chimeric gene.
22. (Original) The method according to claim 21 wherein the promoter sequence is the pea vicilin gene promoter and the plant is a dicotyledonous plant.
23. (Original) The method according to claim 21 wherein the chimeric gene further comprises the pea vicilin gene promoter and transcription terminator sequences.
24. (Previously presented) The method according to claim 22 wherein the plant is pea or chickpea.
25. (Original) The method according to claim 21 wherein the promoter sequence is a wheat HMW glutenin gene promoter and the plant is a monocotyledonous plant.

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26. (Original) The method according to claim 21 wherein the chimeric gene further comprises the wheat HMW glutenin gene promoter and/or NOS transcription terminator sequences.
27. (Previously presented) The method according to claim 25 wherein the plant is a rice plant.
28. (Previously presented) A method of modifying the fatty acid content of seeds of a plant, said method comprising:
 - (i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds;
 - (ii) determining the level of a fatty acid in the seed; and (iii) selecting a plant having a modified fatty acid content in the seeds thereof as compared to the seeds of a plant which does not express the chimeric gene.
29. (Original) The method according to claim 28 wherein the promoter sequence is the pea vicilin gene promoter and the plant is a dicotyledonous plant.
30. (Original) The method according to claim 28 wherein the chimeric gene further comprises the pea vicilin gene promoter and transcription terminator sequences.
31. (Previously presented) The method according to claim 29 wherein if the plant is lupin the level of fatty acids in the seeds is increased.

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32. (Previously presented) The method according to claim 29 wherein if the plant is pea the level of fatty acids in the seeds is decreased.
33. (Currently amended) A method of modifying the fatty acid composition of seeds of a plant, said method comprising (i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant; (ii) determining the fatty acid composition of the seeds; and (iii) selecting a plant having a modified fatty acid composition in the seeds thereof, as compared to seeds of a plant in which the chimeric gene is not expressed.
34. (Original) The method according to claim 33 wherein the promoter sequence is the pea vicilin gene promoter and the plant is a dicotyledonous plant.
35. (Original) The method according to claim 33 wherein the chimeric gene further comprises the pea vicilin gene promoter and transcription terminator sequences.
36. (Previously presented) The method according to claim 34 wherein the plant is lupin.
37. (Previously presented) The method according to claim 33 wherein the fatty acid is selected from the group consisting of: myristic acid, stearic acid, gadoleic acid, behenic acid, lignoceric acid, oleic acid, linoleic acid, linolenic acid and erucic acid.
38. (Previously presented) A method of decreasing the starch content of seeds of a plant, said method comprising:

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- (i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant;
- (ii) determining the starch content of the seeds; and
- (iii) selecting a plant having a decreased starch content in the seeds thereof, as compared with seeds of a plant in which the chimeric gene is not expressed.

39. (Original) The method according to claim 38 wherein the promoter sequence is the pea vicilin gene promoter and the plant is a dicotyledonous plant.

40. (Original) The method according to claim 38 wherein the chimeric gene further comprises the pea vicilin gene promoter and transcription terminator sequences.

41. (Previously presented) The method according to claim 39 wherein the plant is a pea plant.

42. (Currently amended) A method of modifying the amino acid composition of seeds of a plant, said method comprising:

- (i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant;
- (ii) determining the amino acid composition of the seeds; and

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(iii) selecting a plant having a modified amino acid composition in the seeds thereof, as compared to a plant in which the chimeric gene is not expressed.

43. (Original) The method according to claim 42 wherein the promoter sequence is the pea vicilin gene promoter and the plant is a dicotyledonous plant.

44. (Original) The method according to claim 42 wherein the chimeric gene further comprises the pea vicilin gene promoter and transcription terminator sequences.

45. (Previously presented) The method according to claim 43 wherein the plant is pea or chickpea.

46. (Original) The method according to claim 45 wherein the proportion of arginine relative to other amino acids is increased.

47. (Previously presented) A method of modifying the fibre content of seeds of a plant, said method comprising:

- (i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant;
- (ii) determining the fibre content of the seeds; and
- (iii) selecting a plant having a modified fibre content in the seeds thereof, as compared with seeds of a plant which does not express said chimeric gene.

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48. (Original) The method according to claim 47 wherein the promoter sequence is the pea vicilin gene promoter and the plant is a dicotyledonous plant.
49. (Original) The method according to claim 47 wherein the chimeric gene further comprises the pea vicilin gene promoter and transcription terminator sequences.
50. (Previously presented) The method according to claim 48 wherein if the plant is lupin the level of soluble fibre including soluble NSP in the seed is decreased.
51. (Previously presented) The method according to claim 48 wherein if the plant is a pea plant the level of fibre in the seed is increased.
52. (Previously presented) A method of modifying the fibre quality of seeds of a plant, said method comprising:
 - (i) the step of expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant;
 - (ii) determining the fibre quality of the seeds; and
 - (iii) selecting a plant having a modified fibre quality in the seeds thereof, as compared with seeds of a plant in which the chimeric gene is not expressed.
53. (Original) The method according to claim 52 wherein the promoter sequence is the pea vicilin gene promoter and the plant is a dicotyledonous plant.

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54. (Original) The method according to claim 53 wherein the chimeric gene further comprises the pea vicilin gene promoter and transcription terminator sequences.
55. (Previously presented) The method according to claim 53 wherein the plant is lupin.
56. (Previously presented) The method according to claim 52 wherein the level of soluble NSP and/or the level of insoluble NSP in the seed is decreased.
57. (Previously presented) The method according to claim 52 wherein the level of lignin in the seed is increased.

58-63.(Canceled)

64. (Previously presented) The method according to any one of claims 1, 21, 28, 33, 38, 42, 47, or 52 further comprising the first steps of:
 - (i) introducing the chimeric gene into a plant cell, tissue, organ or whole organism; and
 - (ii) regenerating an intact plant therefrom.
65. (Previously presented) A transformed plant produced by the method according to any one of claims 1, 21, 28, 33, 38, 42, 47, 52, or 102, or progeny of said plant, wherein said progeny comprises at least one copy of the chimeric gene in an expressible format, said plant being wheat, oats, maize, barley, rice, sorghum, millet, oilseed rape, rye, safflower, sunflower, potato, sweet potato, beetroot, taro, Jerusalem artichoke, onion, garlic, soybean, pea, bean (including joba and common bean), lentil, chickpea or sugar cane.

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66. (Cancelled)
67. (Previously presented) A plant part derived from the plant according to claim 65 wherein said plant part comprises at least one copy of the chimeric gene present in said plant or progeny in an expressible format.
68. (Previously presented) The plant part according to claim 67 selected from the group consisting of: leaves, stems, roots, shoots, seed, tubers and flowers.
69. (Original) The plant part according to claim 67 consisting of seeds.
- 70-85.(Cancelled)
86. (Previously presented) The method according to claim 1 wherein the storage organ is a tuber.
87. (Previously presented) The method according to claim 1 wherein the storage organ is a specialized stem.
88. (Previously presented) The method of claim 1 wherein the chimeric gene encodes sunflower seed albumin (SSA) and wherein the storage organ is a seed and wherein the total protein nitrogen content of the seed is increased.
89. (Previously presented) The method of claim 1 wherein the chimeric gene encodes sunflower seed albumin (SSA) and wherein the storage organ is a seed and wherein the amino acid composition of the seed is modified.

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90. (Previously presented) The method of claim 1 wherein the chimeric gene encodes sunflower seed albumin (SSA) and wherein the storage organ is a seed and wherein expression of the chimeric gene in the seed increases or decreases the fibre content of the seed.
91. (Previously presented) The method of claim 1 or claim 102 wherein the chimeric gene encodes sunflower seed albumin (SSA) and wherein the storage organ is a seed and wherein expression of the chimeric gene in the seed modifies the fibre composition of the seed.
92. (Previously presented) The method of claim 1 wherein the chimeric gene encodes sunflower seed albumin (SSA) and wherein the storage organ is a seed and wherein expression of the chimeric gene in the seed decreases the total starch content of the seed.
93. (Previously presented) The method of claim 1 wherein the chimeric gene encodes sunflower seed albumin (SSA) and wherein the storage organ is a seed and wherein expression of the chimeric gene in the seed increases or decreases the total fatty acid content of the seed.
94. (Previously presented) The method of claim 1 wherein the chimeric gene encodes sunflower seed albumin (SSA) and wherein the storage organ is a seed and wherein expression of the chimeric gene in the seed modifies the fatty acid composition of the seed.
95. (Canceled)

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96. (Previously presented) The method of claim 1 wherein the chimeric gene encodes sunflower seed albumin (SSA) and further comprises a promoter sequence which confers strong expression at least in the seeds of the plant.
97. (Previously presented) The method according to claim 96 wherein the promoter is the pea vicilin promoter.
98. (Previously presented) The method according to claim 96 wherein the promoter is the wheat HMW glutenin promoter.
99. (Previously presented) The method of claim 96 wherein the chimeric gene further comprises a transcription terminator sequence placed downstream of the sequence encoding SSA.
100. (Previously presented) The method of claim 99 wherein the transcription terminator sequence is the pea vicilin gene terminator sequence.
101. (Previously presented) The method according to claim 1 or claim 102, wherein the content or composition, or content and composition, of more than one metabolite in the storage organ of the plant is modified, and wherein at least one of said metabolites is selected from the group consisting of fatty acid, starch, soluble non-starch polysaccharide, insoluble non-starch polysaccharide, fibre and total protein nitrogen.
102. (Previously presented) A method of modifying the content or composition, or content and composition, of a metabolite in the storage organ of a plant, said metabolite selected from the group consisting of fatty acid, starch, soluble non-

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starch polysaccharide, insoluble non-starch polysaccharide, fibre, and total protein nitrogen, said method comprising:

- (i) expressing in the storage organ of the plant a chimeric gene comprising a nucleotide sequence encoding a sulfur-rich protein placed operably in connection with a promoter sequence capable of conferring expression in said storage organ, wherein the sulfur-rich protein is a 2S protein or the Asp1 synthetic protein; and
- (ii) determining the content or composition, or content and composition, of a metabolite in said storage organ, said metabolite selected from the group consisting of fatty acid, starch, soluble non-starch polysaccharide, insoluble non-starch polysaccharide, fibre and total protein nitrogen.

103. (Previously presented) A method of increasing the total protein nitrogen content of seeds of a plant, said method comprising:

- (i) expressing in the seeds of the plant a chimeric gene comprising a nucleotide sequence encoding a sulfur-rich protein placed operably in connection with a promoter sequence capable of conferring expression in said seeds, wherein the sulfur rich protein is a 2S protein or the Asp1 synthetic protein, said nucleotide sequence also positioned upstream of a transcription termination sequence; and
- (ii) determining the level of total protein nitrogen in the seeds of said plants.

104. (Previously presented) A method of modifying the fatty acid content of seeds of a plant, said method comprising:

- (i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection

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with a promoter sequence capable of conferring expression on said structural gene in the seeds; and

(ii) determining the level of a fatty acid in the seeds.

105. (Previously presented) A method of modifying the fatty acid composition of seeds of a plant, said method comprising:

(i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant; and

(ii) determining the fatty acid composition of the seeds.

106. (Previously presented) A method of decreasing the starch content of seeds of a plant, said method comprising:

(i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant; and

(ii) determining the starch content of the seeds.

107. (Previously presented) A method of modifying the amino acid composition of seeds of a plant, said method comprising:

(i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection

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with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant; and

- (ii) determining the amino acid composition of the seeds.

108. (Previously presented) A method of modifying the fibre content of seeds of a plant, said method comprising:

- (i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant; and

- (ii) determining the fibre content of the seeds

109. (Previously presented) A method of modifying the fibre quality of seeds of a plant, said method comprising:

- (i) expressing in the seeds of said plant a chimeric gene that comprises a structural gene sequence encoding sunflower seed albumin (SSA) placed upstream of a transcription termination sequence and operably in connection with a promoter sequence capable of conferring expression on said structural gene in the seeds of said plant; and

- (ii) determining the fibre quality of the seeds.

110. (Previously presented) The method according to claim 1, wherein the total protein nitrogen content of storage organ of the plant is increased by at least 10%.

111. (Previously presented) The method according to claim 1, wherein the total amino acid composition of storage organ of the plant is increased by at least 8%.

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112. (Previously presented) The method according to claim 1, wherein the total fibre content of the storage organ of the plant is increased or decreased by at least 5%.
113. (Previously presented) The method according to claim 1, wherein the total starch content of storage organ of the plant is reduced by at least 10%.
114. (Previously presented) The method according to claim 1, wherein the total fatty acid content of storage organ of the plant is increased or decreased by 5%.
115. (Previously presented) The method according to claim 1, wherein the content of any one fatty acid in the storage organ of the plant is increased or decreased by 5%.